



# Graveyard Spit Restoration & Resilience Project

## Preliminary Site Area Management Plan

### Shorelands and Environmental Assistance Program

Washington State Department of Ecology  
Olympia, Washington

### Washington State Department of Transportation

Southwest Region  
Vancouver, Washington



## Document Information

This document will be published at the Graveyard Spit Restoration & Resilience Project website once funding is secured for project implementation.

Cover Photo: Graveyard Spit. Provided by the Washington State Department of Transportation

## Contact Information

### Shorelands and Environmental Assistance Program

Henry Bell  
P.O. Box 47600  
Olympia, WA 98504-7600  
Phone: 360-628-2750

**Website<sup>1</sup>:** [Washington State Department of Ecology](https://ecology.wa.gov)

## ADA Accessibility

The Department of Ecology is committed to providing people with disabilities access to information and services by meeting or exceeding the requirements of the Americans with Disabilities Act (ADA), Section 504 and 508 of the Rehabilitation Act, and Washington State Policy #188.

To request an ADA accommodation, contact Ecology by phone at 360-480-2209 or email at [sydney.fishman@ecy.wa.gov](mailto:sydney.fishman@ecy.wa.gov). For Washington Relay Service or TTY call 711 or 877-833-6341. Visit [Ecology's website<sup>2</sup>](https://ecology.wa.gov) for more information.

---

<sup>1</sup> <https://ecology.wa.gov/About-us/Get-to-know-us/Contact-us>

<sup>2</sup> <https://ecology.wa.gov/About-us/Accountability-transparency/Accessibility>

# Acknowledgements

Friends of North Cove

Moffatt and Nichol

Mott MacDonald

National Fish and Wildlife Foundation National Coastal Resilience Fund

NOAA Office for Coastal Management

North Willapa Harbor Grange #947

Pacific Conservation District

Pacific County

Pacific County Drainage District #1

Shoalwater Bay Indian Tribe

U.S. Army Corps of Engineers Seattle District

U.S. Environmental Protection Agency

U.S. Fish and Wildlife Service

Washington Sea Grant

Washington State Department of Ecology

Washington State Department of Fish and Wildlife

Washington State Department of Natural Resources

Washington State Department of Transportation

Washington State Historic Preservation Office

Washington State Parks and Recreation Commission

Willapa Erosion Control Action Now (WECAN) Community Forum

# Table of Contents

<b>List of Figures</b> .....	<b>6</b>
<b>Acronyms and Abbreviations</b> .....	<b>7</b>
<b>Executive Summary</b> .....	<b>8</b>
<b>1. Introduction</b> .....	<b>9</b>
1.1 Purpose of the Plan.....	9
1.2 Site Management Goals.....	9
1.3 Adaptive Management of the Site.....	10
1.3 Local, State, Federal, and Tribal Authorities.....	10
<b>2. Project Background</b> .....	<b>15</b>
2.1 Project Description .....	15
2.2 Project Area .....	15
2.3 History of Erosion in the Region .....	16
2.4. Community Context and Recent Erosion Impacts .....	17
<b>3. Site Conditions</b> .....	<b>18</b>
3.1 Coastal Processes and Erosion of Graveyard Spit.....	18
3.2 Geology and Soils.....	19
3.3 Vegetation and Wildlife .....	19
3.4 Threatened and Endangered Species .....	20
3.5 Cultural and Historic Resources .....	21
3.6 Existing Uses .....	22
<b>4. Adjacent and Adjoining Erosion Control Efforts</b> .....	<b>23</b>
4.1 State Route 105 Protections .....	23
4.2 North Cove Dynamic Revetments.....	23
4.3 Shoalwater Berm Dune Nourishment Project .....	24
4.4 Master Plan for Erosion Control Action in the Region .....	25
<b>5. Management Goals and Objectives</b> .....	<b>26</b>
Goal 1: Prevent further erosion of Graveyard Spit and support the integrity of Empire Spit to protect community assets .....	27
Goal 2: Protect and restore sensitive dune, saltmarsh, and intertidal environments and enhance habitat for protected species.....	28
Goal 3: Support responsible recreational use and stewardship of the project site area .....	30

Goal 4: Engage in regional coordination and prioritize transparent and collaborative planning and decision-making .....31

Goal 5: Carry out monitoring and adaptive management of the project site area to anticipate and respond to future conditions .....32

**References..... 35**

# List of Figures

Figure 1. WSDOT staff stand in front of a pilot dynamic revetment installed in front of SR 105 on the western side of the project site area, 2020. ....15

Figure 2. The Graveyard Spit Restoration and Resilience Project site and surrounding area. ....16

Figure 3. US Coast & Geodetic Survey map of Cape Shoalwater from 1898. The approximate location of the current project area is provided in red. Image provided by Kiers, 2021. ....17

Figure 4. View of intertidal marsh on Graveyard Spit, 2021.....19

Figure 5. Western snowy plover nesting areas on Graveyard Spit are closed to public access, 2021. ....20

Figure 6. This photo series shows sand accumulation and vegetation establishment between 2018 and spring of 2021 on a selected monitoring profile of the North Cove Dynamic Revetment Project. ....23

Figure 7. Ongoing and proposed erosion protection projects in the region of North Cove and Tokeland, as of January 2021. Provided by Mott MacDonald.....25

## Acronyms and Abbreviations

CHRN	Washington Coastal Hazards Resilience Network
CMAP	Washington State Department of Ecology Coastal Monitoring & Analysis Program
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
NFWF	National Fish and Wildlife Foundation
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
SCA	Seashore Conservation Area
SEPA	State Environmental Policy Act
SR 105	State Route 105
State Parks	Washington State Parks and Recreation Commission
USACE	U.S. Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WDFW	Washington State Department of Fish and Wildlife
WECAN	Willapa Erosion Control Action Now
WSDOT	Washington State Department of Transportation
WSG	Washington Sea Grant

## Executive Summary

The Washington Coastal Zone Management Program (housed at the Washington State Department of Ecology), Washington State Department of Transportation, and U.S. Army Corps of Engineers Seattle District have conducted the final design and permitting for the Graveyard Spit Restoration and Resilience Project, with support from the National Coastal Resilience Fund. This work was completed in partnership with the Shoalwater Bay Tribe, Pacific County, the communities of North Cove and Tokeland, and other local, state, and federal entities.

Located along the north shore of Willapa Bay on Washington State's Pacific Coast, the project will halt the rapid loss of an important sand spit and back-barrier estuary using innovative nature-based engineering and design. By restoring and protecting the marsh and tidal embayment environment, this project proactively prevents impacts of erosion, flooding, and sea level rise on multiple communities, federally protected species, traditional and cultural resources, public access, the local economy, and the region's primary highway and utility infrastructure.

This Preliminary Site Area Management Plan outlines the goals and objectives for the post-construction management of the site area utilizing an adaptive management approach that prioritizes transparency and collaborative decision-making.

The following management goals have been established for the project site area:

1. Prevent further erosion of Graveyard Spit and support the integrity of Empire Spit to protect community assets.
2. Protect and restore sensitive dune, saltmarsh, and intertidal environments and enhance habitat for protected species.
3. Support continued recreational use and public stewardship of the project site area.
4. Engage in regional coordination and prioritize transparent and collaborative planning and decision-making.
5. Carry out monitoring and adaptive management of the project site area to anticipate and respond to future conditions.

In accordance with the adaptive management process, this plan will be updated as necessary throughout the lifetime of the Graveyard Spit Restoration and Resilience Project.

More information about this project and other erosion control efforts undertaken in the regional can be found on the [Willapa Erosion Control Action Now webpage](https://wacoastalnetwork.com/local-projects/wecan).<sup>3</sup>

---

<sup>3</sup> <https://wacoastalnetwork.com/local-projects/wecan>



# 1. Introduction

This Preliminary Site Management Plan for the Graveyard Spit Restoration and Resilience Project supports the effective management, monitoring, and maintenance of the project and site area after the final designs, permitting, and construction of the dynamic revetment and dune are completed.

This document was developed by the Washington State Department of Ecology in coordination with staff at the Washington State Department of Transportation, the U.S. Army Corps of Engineers, the Shoalwater Bay Tribe and many other local, state, and federal partners. Funding from the National Fish and Wildlife Foundation (NFWF) National Coastal Resilience Fund supported the development of this plan.

## 1.1 Purpose of the Plan

The purposes of the Preliminary Site Area Management Plan are to:

- Lay out the broad goals and objectives of the project in order to establish a shared vision for the future management of the project site area
- Summarize project site conditions, existing uses, and historical context
- Identify relevant authorities and their roles associated with the completion and ongoing maintenance of the project
- Serve as facilitation aid for decision-making throughout the project development and implementation process

## 1.2 Site Management Goals

The Preliminary Site Area Management Plan provides an outline for how the Graveyard Spit Restoration and Resilience Project site area will be managed in order to balance potential conflicts between habitat and endangered species recovery, project maintenance and renourishment, and the public use of the site. The goals listed here lay out a broad strategy for the care and management of the site once construction is completed.

1. Prevent further erosion of Graveyard Spit and support the integrity of Empire Spit to protect State Route 105, the Shoalwater Bay Tribe, and nearby communities.
2. Protect and restore sensitive dune, saltmarsh, and intertidal environments and enhance habitat for protected species.
3. Support responsible recreational use and public stewardship of the project site area.
4. Engage in regional coordination and prioritize transparent and collaborative planning and decision-making.
5. Carry out monitoring and adaptive management of the project site area to anticipate and respond to future conditions.

See Section 5 for detailed information on these goals and objectives.

## 1.3 Adaptive Management of the Site

Adaptive management is an iterative process for continually improving site management through regular monitoring of site conditions that may change over time due to human and natural causes and the results of past management actions. The project includes the installation of a cobble dynamic revetment and the restoration of the historic dune berm along the length of Graveyard Spit, restoration and protection of wetland and tidal marsh, monitoring of the project and environmental conditions, and the management of the project site area. To ensure that the future desired conditions of Graveyard Spit and the surrounding area are met, this site management plan, including goals and objectives, will be reviewed and updated as necessary throughout the lifetime of the project.

Adaptive management will help the project partners continually integrate monitoring results and new information related to the area in and around Graveyard Spit, including geomorphic processes, conditions of habitats and species, and existing uses of the site. Ahead of each review and update to the plan, the project partners will work with overlapping and adjoining jurisdictions, authorities, and stakeholders including the Shoalwater Bay Tribe, Pacific County, local landowners, and interest groups such as the Willapa Erosion Control Action Now (WECAN) community forum to ensure continued cooperative management and stewardship of the site area.

Information resulting from monitoring activities in and around the site area will be used to inform whether current management actions are meeting the goals and objectives of the Graveyard Spit Restoration and Resilience Project. If management actions are failing to create the desired conditions at the site, potential changes will be evaluated and adopted with the goal of achieving the desired conditions.

For more information on the adaptive management process, see Section 5, Goal 5: Carry out monitoring and adaptive management of the project site area.

## 1.3 Local, State, Federal, and Tribal Authorities

This plan was developed through consultation with project team members, partners, and other management authorities. The successful management of the project will require continued coordination and collaboration with public and private entities at local, state, federal, and tribal levels. This section provides information on jurisdictional, regulatory, and management authorities within or adjacent to the Graveyard Spit Restoration and Resilience Project site area.

### Shoalwater Bay Tribe

The project site area is located partially within the Shoalwater Bay Tribal Reservation. The Shoalwater Bay Tribe manages cultural and natural resources located on its reservation lands. It is essential that the management goals and activities identified in this plan do not impair the Shoalwater Bay Tribe's sovereign tribal rights or be in conflict with tribal natural resource or

cultural interests. The Shoalwater Bay Tribe supports the Graveyard Spit Restoration and Resilience Project as a key part of the regional strategy to address decades of coastal hazards impacts due to erosion and flooding.

To comply with Section 106 of the National Historic Preservation Act, the project team consulted the Shoalwater Bay Tribe and with the Washington State Historic Preservation Office for this project. The project team will continue to coordinate with the Shoalwater Bay Tribe on the advancement of the project and management of the project site area.

The Shoalwater Bay Indian Tribe will continue to support Snowy Plover and Streak Horned Lark recovery efforts in the project site area by conducting surveys, providing public information and education, and coordinating efforts with partners for the Graveyard Spit Project.

## **Washington State Parks and Recreation Commission**

The Washington State Parks and Recreation Commission (State Parks) is the land management agency for Seashore Conservation Area (SCA). The SCA generally covers areas below Ordinary High Water (OHW) and above the line of extreme low tide. The broad principles of the SCA are to preserve the condition of these areas and encourage and permit public recreation.

The project team consulted with State Parks to ensure the Site Area Management Plan would support the goals of the SCA. The project team will continue to coordinate with State Parks on the management of the site area as it related to their authority under the SCA.

## **Washington State Department of Transportation**

The Washington State Department of Transportation (WSDOT) is responsible for protecting State Route (SR) 105 from coastal erosion damage. WSDOT conducts regular maintenance and emergency stabilization projects to maintain SR 105. Through the construction and maintenance of the dynamic revetment and dune berm, this project aims to significantly reduce the need for future emergency stabilization and protection measures in the vicinity of Graveyard Spit. Particular attention will be given to maintaining the integrity of the transition zone at the west end of the project site area, where the dynamic revetment transitions to large rock revetment protections.

WSDOT is anticipated to oversee the construction and implementation of the project, and would be responsible for the project maintenance and replenishment cycle, including responsibility for maintaining the on-site stockpile of cobble near the western terminus of the project alignment to facilitate periodic maintenance of the dynamic revetment.

## **Washington State Department of Ecology**

The Washington State Department of Ecology (Ecology) administers several programs that protect environmental resources, including Spill Prevention, Preparedness and Response, Air Quality, Water Quality, Toxics Cleanup, Shorelands Assistance, Water Resources, Solid Waste, and Hazardous Waste and Toxic Reduction.

Ecology issues water quality consistency certifications under Section 401 of the Clean Water Act. The project team is coordinating with Ecology's Southwest Regional Office and Stormwater Section and the Environmental Protection Agency (EPA) to acquire a Section 401 water quality certification.

The Coastal Zone Management Act of 1972 as amended requires Federal agencies to carry out their activities in a manner which is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Zone Management (CZM) Program. This project will require CZM concurrence from Ecology.

The project also requires a Section 402 National Pollution Discharge Elimination System (NPDES) Construction Stormwater General Permit (CSWGP), in coordination with Ecology and the EPA.

## **Washington State Department of Fish and Wildlife**

The Washington State Department of Fish and Wildlife (WDFW) is responsible for preserving, protecting, and perpetuating all fish and shellfish resources of the State. The Hydraulic Code (Chapter 77.55 RCW) requires that any person, organization, or government agency wishing to conduct any construction activity that will use, divert, obstruct, or change the bed or flow of State waters must do so under the terms of the Hydraulic Project Approval issued by WDFW. The purpose of the permit is to address any potential damage or loss of fish and shellfish habitat which is considered to result in direct loss of fish and shellfish production. Project impacts below the Ordinary High Water Mark (OHWM) will require a Hydraulic Project Approval (HPA) from WDFW.

WDFW also has authority over the management of commercial and recreational shellfish harvest and fisheries. Within the project site area, they co-manage commercial and recreational finfish and shellfish harvest along with the Shoalwater Bay Tribe.

WDFW will continue to advise the project team on topics related to priority habitat and species protections, hydraulic permitting and mitigation solutions, monitoring of vegetation and wildlife within the project site area and other aspects of the Site Area Management Plan as applicable.

## **U.S. Fish and Wildlife Service**

The U.S. Fish and Wildlife Service (USFWS) is charged with protecting plant, terrestrial animal, and some fish species listed under the federal Endangered Species Act and the Migratory Bird Treaty Act and the habitats those species rely upon. USFWS is also mandated to coordinate with state agencies through the Fish and Wildlife Coordination Act.

In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species. In order to satisfy the

requirements of the ESA, this project will undergo formal ESA consultation for listed species and designated critical habitat with the National Marine Fisheries Service (NMFS) and informal consultation with USFWS. Twenty-three species protected by ESA, as amended, are potentially found in the vicinity of the project.

The project team will coordinate with USFWS and WDFW on bird surveys, maintenance and nourishment timing and impact reduction and avoidance measures, and other aspects of the ESA Protection Plan for western snowy plover and streaked horned lark.

## **National Marine Fisheries Service**

The National Marine Fisheries Service (NMFS) is responsible for the protection of marine and freshwater species under the Endangered Species Act and the Marine Mammal Protection Act. NMFS is also responsible for consultation under the Magnuson-Stevens Fishery Conservation and Management Act. The project area is located within designed Essential Fish Habitat (EFH) for salmon, groundfish, and coastal pelagic species as designated under this Act. The project team will consult with NMFS to avoid, minimize, or otherwise offset potential adverse impacts to EFH.

## **U.S. Environmental Protection Agency**

The Environmental Protection Agency (EPA) jointly administers Section 404 of the Clean Water Act with the U.S. Army Corps of Engineers and, along with the Washington State Department of Ecology, is responsible for water quality certification under Section 401 of the Clean Water Act. The project team will consult with the EPA on these aspects.

EPA issues National Pollutant Discharge Elimination System (NPDES) permits on tribal lands. Section 402 of the Clean Water Act would be triggered by construction, as the area of disturbance would be greater than one acre. A Stormwater Pollution Prevention Plan will be prepared and a NPDES Construction General Permit will be acquired prior to construction.

## **U.S. Army Corps of Engineers**

The project team coordinated with the U.S. Army Corps of Engineers (USACE) throughout the project process. USACE is the federal lead for the National Environmental Policy Act (NEPA) process, for which the project team completed a Biological Assessment to document and analyze potential environmental impacts. It was determined that the project would fall under USACE Categorical Exclusion (CE) 33 CFR 230.9.

Under Section 10 of the Rivers and Harbors Act, USACE oversees any in-water construction in navigable waters. No long-term effects to navigation are expected to occur as a result of the project and the management of the site area.

Additionally, USACE issues Section 404 permits under the authority of the Clean Water Act. Impacts to wetlands and other waters of the state will require a Section 404 Nationwide Permit (NWP) 27 & Section 10 permit from USACE.

USACE is the lead federal agency responsible for compliance with Section 106 of the National Historic Preservation Act. WSDOT conducted a cultural resources survey to assist the USACE in fulfilling obligations under Section 106 and its implementing regulations, 36 CFR 800.

USACE manages the Shoalwater Dune Nourishment Project under the authority of Section 545 of the Water Resources Development Act (WRDA) of 2000, as amended. The Shoalwater Dune Nourishment Project is located on Empire Spit, directly east of the project site area. In addition, USACE is advancing the North Cove Shoreline Protection Project through the Continuing Authorities Program (CAP) Section 103 of the River and Harbor Act of 1962, as amended. The North Cove Shoreline Protection Project is located west of the project site area. The project team will continue to coordinate with USACE to share information and management practices and ensure that the management of these linked projects mutually benefit one another.

## **Pacific County**

The 1971 Shoreline Management Act (SMA) ensures the responsible use and development of shorelines in the state. Pacific County is the primary manager of shoreline use through their Shoreline Master Program. Impacts to the shoreline and critical habitat are permitted by the Pacific County Shoreline Master Program, Ordinance No. 183. Pacific County reviewed the project in consultation with Ecology and determined that the project meets the requirements for RCW 90.58.356(2)(d) due to threats to State Route 105 and will not require shoreline permits from the county.

Pacific County is the project lead on the development of an Erosion Control Master Plan for the region. The project team will coordinate with Pacific County and other partners to contribute toward the goals and objectives of the Erosion Control Master Plan.

## 2. Project Background

### 2.1 Project Description

The Graveyard Spit Restoration and Resilience Project is an innovative nature-based dune and dynamic revetment to restore and protect Graveyard Spit, located on the northern shore of Willapa Bay in Washington State. The project is intended to halt the ongoing loss of the spit and the vulnerable back-barrier estuary, while also protecting vital community infrastructure that is threatened by coastal erosion, flooding, and sea level rise. The implementation of the project is part of a larger regional strategy to address decades of coastal hazard impacts from erosion and flooding. The strategy was developed over the course of four years through a coordinated and collaborative multi-stakeholder planning process.

The Graveyard Spit project builds from a 2015 Washington State Department of Transportation (WSDOT) analysis of options for maintaining State Route 105 (SR 105) along the Willapa Bay shoreline and a 2018 Planning Assistance to States study between the WSDOT and the US Army Corp of Engineers that further evaluated options and developed preliminary designs and recommendations.

The project will maintain marsh and tidal embayment environments; enhance habitat for western snowy plover, streaked horn lark, Dungeness crab, and salmonids; provide coastal hazard mitigation for the communities North Cove, Tokeland, and the Shoalwater Bay Tribe; and protect the region's primary transportation corridor from erosion, debris, and flooding.



Figure 1. WSDOT staff stand in front of a pilot dynamic revetment installed in front of SR 105 on the western side of the project site area, 2020.

### 2.2 Project Area

Willapa Bay is located on the Pacific Coast of Washington State. Grays Harbor lies to the north, while the mouth of the Columbia River is approximately 30 miles south. The Long Beach Peninsula, a 20-mile-long barrier spit, protects Willapa Bay from the swells of the Pacific Ocean. The bay itself is relatively shallow, with extensive stretches of mudflat, shoals, islands, and salt marsh. At 260 square miles in area, Willapa Bay is the largest estuary in Washington and the second largest coastal estuary in the western United States behind San Francisco Bay. The

uplands surrounding Willapa Bay are largely undeveloped, and as such, the bay is regarded as one of the most pristine estuaries in the country.

The Graveyard Spit Restoration and Resilience Project is located along a 3,800-foot stretch of Willapa Bay's northern shoreline. The site lies directly adjacent to SR 105, between the community of North Cove and the Tokeland Peninsula (Figure 2). The project site is located partially on the Shoalwater Bay Tribal Reservation. The State Route 105 groin and dike protrude out into the north entrance channel west of the project area, while Empire Spit lies directly to the east.



Figure 2. The Graveyard Spit Restoration and Resilience Project site and surrounding area.

## 2.3 History of Erosion in the Region

Beach erosion at the mouth of Willapa Bay and along its northern shoreline has been a chronic problem since the turn of the 20<sup>th</sup> century. Prior to the early 1900s, Cape Shoalwater protruded south into the Willapa Bay entrance channel (Figure 3). Covered by large dunes and forested areas, the Cape supported a lighthouse, Coast Guard station, hotel, roads, and homes (Allen, 2004). Since that time, extensive erosion along the northern shore of Willapa Bay erased Cape Shoalwater as well as much of the community of North Cove. Erosion has also heavily impacted Grayland, Tokeland, the Shoalwater Bay Tribe, and other nearby communities. Critical wetland, estuarine, and other coastal habitats have been lost, and a large part of the Willapa National Wildlife Refuge has also disappeared (Talebi et al., 2017). As the shoreline receded, Graveyard Spit also migrated landward to occupy previous marshland (Allen, 2004).



The underlying causes of this erosion are complex. The volume of water that exits the mouth of Willapa Bay between high and low tide – known as the tidal prism – is estimated at more than 10 billion cubic feet (Jarett, 1976). This large tidal range combines with offshore wave action, nearshore currents, and strong seasonal storm surges to collectively transport millions of cubic yards of sediment on this predominantly sandy coastline (Michalsen, 2018). The extensive network of dams along the Columbia River may also be contributing to the problem by reducing the sediment load that reaches the Washington Pacific Coast.

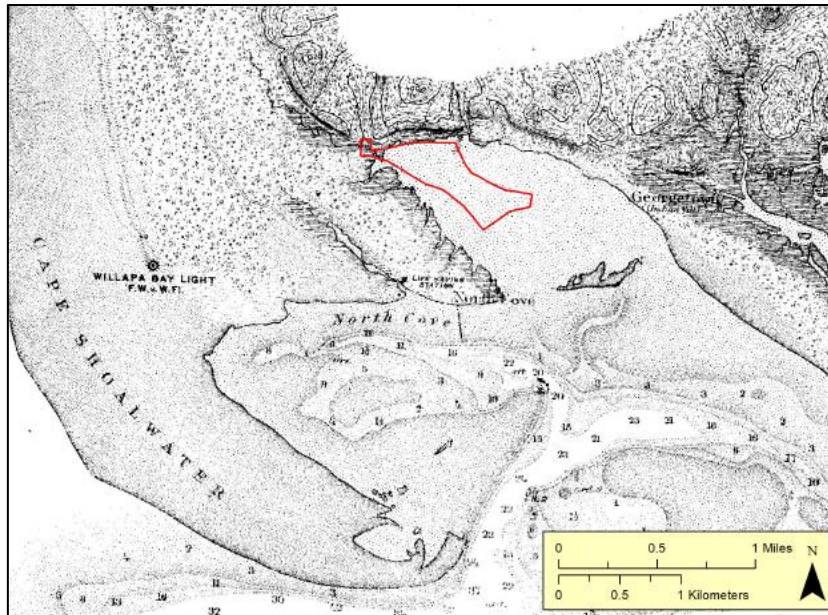


Figure 3. US Coast & Geodetic Survey map of Cape Shoalwater from 1898. The approximate location of the current project area is provided in red. Image provided by Kiers, 2021.

Unlike the neighboring estuaries of Grays Harbor and the mouth of the Columbia River, which are protected by jetties that are miles long, Willapa Bay is a natural inlet (Kaminsky et al., 2010). Although the natural dynamics contribute to making Willapa Bay among the largest and richest estuary systems on Washington’s Pacific Coast, the north shore of the bay has been experiencing decades of flooding, storm surges, and the fastest rates of eroding shoreline on the entire United States west coast – averaging 100 feet per year over the past century in some places (Michalsen, 2018; Pacific County, 2010)

The ongoing erosion has had devastating consequences for lands of cultural and historical significance, the local economy, recreation and public access, endangered species, important natural habitat, and critical infrastructure. This includes a key section of State Route 105, which is the region’s primary transportation and utility corridor.

## 2.4. Community Context and Recent Erosion Impacts

West of the project area and at the mouth of Willapa Bay lies the community of North Cove, where the shoreline has eroded away at an average rate of 100 feet per year over the course of the past century. As of 2016, 537 parcels totaling 2,018 acres have been lost, with an estimated total value of \$20.3 million. 2017 projections indicated that an additional 499 parcels totaling 547 acres would erode by 2060 if no protection measures were taken (Talebi et al., 2017).

The Shoalwater Indian Tribal Reservation uplands, which total 440 acres, are becoming increasingly vulnerable to shoreline erosion and flooding. Subsistence shellfish habitat is rapidly being lost to in-filling with sand from storm waves overwashing the eroding barrier dune and depositing sand in the estuarine embayment. This also has caused the loss of native plant species used for traditional cultural and subsistence purposes. Properties that include housing, commercial development, businesses, tribal government and administration, and historic tribal cemetery are also at risk of being damaged or destroyed. The largest economic loss would stem from the Tribal Center, Casino, and Tribal Medical and Dental Clinics. Their total value is estimated at over \$14.5 million, which does not include cost of replacement. The Tribe is among the largest employers in Pacific County and job losses could severely damage the regional economy.

Storm surges and tidal actions have increasingly threatened to breach State Route 105 (SR 105) in the area surrounding Graveyard Spit, particularly during winter months. In addition to flooding lands of cultural and historical significance to the Shoalwater Bay Tribe and approximately 4,000 acres of public and private lands, this would likely result in the inundation of approximately 350 acres of Grayland's cranberry farms. Saltwater inundation would cause long-term crop failure, resulting in a direct loss to the local economy of at least \$3 to \$5 million each year (Patten).

Willapa Erosion Control Action Now (WECAN) is an ongoing community initiative working to mitigate erosion along the northern shores of Willapa Bay. Particularly severe storms that hit the area during the El Niño winter of 2015, and studies of the area by Pacific County, the Washington Department of Ecology, and the US Army Corps of Engineers resulted in updated erosion projections for the shoreline. In response, Chairwoman Charlene Nelson of the Shoalwater Bay Tribe, Pacific County Commissioner Lisa Ayers, and David Cottrell, the commissioner of Pacific County Drainage District No. 1, established WECAN as a forum for activism around the ongoing erosion issue. The leadership of WECAN was instrumental in focusing resources on the development of the Graveyard Spit Restoration and Resilience Project.

## **3. Site Conditions**

### **3.1 Coastal Processes and Erosion of Graveyard Spit**

The north shore region of Willapa Bay is composed of a series of barrier spits driven primarily by swash zone driven longshore transport. Historically, longshore sediment transport from the beaches in and around North Cove supplied a significant volume of sand to the region in summer months when northwesterly wave incidence is predominant. Windblown sand formed protective dunes situated on these spits. However, the historic rates of sediment began to change as the north entrance channel to Willapa Bay shifted shoreward. Additionally, engineered structures to protect SR 105 further reduced the historic sediment load that fed the spits.

Over time, the updrift regions of Graveyard Spit and Empire Spit became sediment deprived and the protective dunes were incised and breached during storm events. Following the loss of the dunes, the spits began to migrate landward toward Tokeland Peninsula as waves overwashed sediments into the tidal embayment. The restoration of an artificial dune as part of the USACE Shoalwater Berm Dune Nourishment Project aimed to mitigate this process on Empire Spit. However, these processes are still active on Graveyard Spit.

Coastline retreat on Graveyard Spit over the past 15 years was calculated based on repeat aerial photography analysis by WSDOT and Ecology. The average rate of retreat between 2003 and 2019 was calculated at 75 feet per year. Because of this erosion, significant dune and fresh and saltwater wetland habitat has been lost.

### 3.2 Geology and Soils

The project site area consists of flat, bare and sparsely vegetated sandy beach, backed by a small dune crest. This area supports the deposition of surf- and water-borne organic debris, including large woody debris. Behind the dune crest is a vegetated intertidal wetland area.

A soil cross-section developed by the USGS in the Graveyard Spit area (Morton et al. 2002) shows that the area is underlain at depth by Pleistocene littoral sediments, which are in turn overlaid with coarser channel. Above the channel fill is mud, peat, and sand.

### 3.3 Vegetation and Wildlife

A number of important coastal habitats are found in the vicinity of the project area, including sand dunes, sandy beaches, shoals, mudflats, grasslands, saltwater and freshwater marshes, and coniferous forest. The nearshore area is relatively shallow, with habitats that support waterfowl, shorebirds, and raptors that forage on these birds. The Willapa Bay estuary also provides important adult, migratory, and nursery habitats for recreationally and commercially important resources, including salmonids, shellfish, and forage fish that provide prey for other fish and wildlife.

Marsh plants are present across the intertidal areas of the site area, north of the sand beach. This wetland area has retreated result of the erosion of Graveyard Spit and associated sediment overwash that occurs during significant storm and king tide events. As part of the restoration element of this project,



Figure 4. View of intertidal marsh on Graveyard Spit, 2021.

areas of overwashed sand will be removed from the historic marsh area and relocated shoreward to the dune berm. This will allow marsh to revegetate naturally over time. The top and landward sides of the reconstructed dune will sparsely revegetated with native dune grasses to create suitable nesting and foraging habitat for protected bird species.

Freshwater wetlands, fed by drainage from the hills to the north, exist along the northern edges of the marsh close to SR 105. Species present include beach grass, sedges, and rushes. Coastal woodland species fringe the wetland areas along SR 105.

### 3.4 Threatened and Endangered Species



Figure 5. Western snowy plover nesting areas on Graveyard Spit are closed to public access, 2021.

Several state- and federally-listed species are present in the project site area, including western snowy plover and streaked horned lark. The Pacific coastal population of the western snowy plover is listed as threatened under the Endangered Species Act and is listed as endangered by Washington State. This population nests above the high tide line on a variety of beach and dune types including coastal beaches, sand spits, dune-backed beaches, sparsely vegetated dunes, beaches at stream and river mouths, and bluff-backed beaches. On the Washington coast, most adult western snowy plovers arrive during

late April, with maximum numbers present from mid-May to late June. Fledging occurs from late June through August (USFWS 2007). Pairs and individuals have been observed in the Graveyard Spit area annually since 2013. Suitable plover breeding habitat is present in the action area and based on increasing plover counts immediately south of Graveyard Spit, it is assumed that western snowy plovers nest in the project site area.

Streaked horned larks inhabit relatively sparsely vegetated grasslands, beaches, islands, and agricultural fields. They use sparsely vegetated sites dominated by relatively short grasses and they strongly prefer bare ground to vegetation that is more than several inches tall. Pairs and individuals have been observed in the Graveyard Spit area annually since 2017. Because suitable nesting habitat is present, it is assumed that streaked horned larks nest in the project area. Other threatened and endangered species, such as bull trout and marbled murrelet, may visit or use the project area for foraging.

Coastal erosion has continually created, shifted, and destroyed habitats in this dynamic system. Currently, erosion at North Cove and along the shoreline of Graveyard Spit and Empire Spit has reduced the width of these beaches, which are some of the few nesting areas for these threatened species on the Washington coast. Erosion, inundation, and infilling during extreme

high tides and storm events has also reducing the extent of sensitive saltmarsh habitat. Willapa Bay is also an important shorebird feeding areas during the spring and fall migrations. Without the Graveyard Spit Restoration and Resilience Project, there is a high risk that erosion will continue and the existing habitat for many protected species will be lost.

As described in Section 5 of this plan, Graveyard Spit restoration and maintenance activities will avoid nesting seasons and utilize other best management practices reduce impacts to protected species. Nesting areas and other sensitive habitat will also be closed to public access.

### 3.5 Cultural and Historic Resources

Before Europeans settled in the region, the shores of Willapa Bay (called Shoalwater Bay by early settlers) were largely populated by the Lower Chehalis and Willapa Chinook peoples (Hajda, 1990) Many native villages existed in the area, and the shores were used for hunting, shellfish harvesting, and other fishing and subsistence activities. Salmon was a major part of the Lower Chehalis and Willapa Chinook diet and economy, and settlements along Willapa Bay's tributaries were formed to take advantage of salmon runs during late spring and late fall. Winter steelhead also formed an important portion of the diet (Kiers, 2021).

Beginning in the 1830s, diseases introduced by European settlers began to devastate the Willapa Chinook people, leading the Chehalis to expand into the villages around Willapa Bay and changing population compositions (Hajda, 1990). The closest historic settlement to the project site area was located between present day Tokeland and North Cove, one half mile east of the current project. Verne Ray (1938) gave the village name as "na-'mst'cat's", and explained that it was primarily occupied during the winter. The village was called Georgetown at the time of Ray's writing in 1938.

In 1866, the Shoalwater Bay Indian Reservation was created by executive order on the north shore of Willapa Bay to set aside approximately 350 acres of land for the descendants of the native people in the region. The eastern section of the Graveyard Spit project area lies on Shoalwater Bay Tribe reservation lands.

Dr. Richard Daugherty conducted an archaeological survey along the Washington Pacific Coast in 1947 and identified site 45PC17, the nearest recorded site to the current project site area. This site likely coincides with the historic location of Georgetown village. 45PC17 was documented as a "shell mound – village site" with deposits containing "sand loam, shell, fire broken rock, bone and charcoal." Since this time, several archaeological surveys have been conducted close by to the current project site area in association with construction and utility projects. These projects include the USACE Shoalwater Berm Dune Nourishment Project, WSDOT construction and repair work along SR 105, and work undertaken by the Shoalwater Bay Tribe. These surveys encountered little evidence of archaeological deposits, with the exception of fire modified rock possibly associated with site 45PC17 that was then displaced by erosion (Kiers, 2021).

WSDOT archaeologists surveyed the project site area in May 2021 and found no evidence of archeological deposits from pre-European settlement or early European settlement time periods. However, some debris was discovered that could be associated with the large portion of the North Cove community that formerly existed west of the project area but was lost due to erosion. The observed lack of archeological deposits in the project site area may be related to the substantial geomorphic changes that have taken place over the past century. The present location of Graveyard Spit is the result of the rapid erosion of the north Willapa Bay shoreline and associated overwash and sediment deposition that occurred on areas that were former intertidal marsh and sand flats (Kiers, 2021).

Currently, members of the Shoalwater Bay Tribe use shellfish beds and native plant species in the project area for traditional cultural and subsistence purposes. These resources are being lost due to inundation and infilling with sediment. The historic tribal cemetery, tribal housing, commercial businesses, medical and dental clinics, and tribal government and administration buildings are in close proximity to the site and are endangered by the continued erosion of Graveyard Spit.

### **3.6 Existing Uses**

Recreational use has increased in the project site area in recent years. Fishing, bird watching, walking, beach combing, and general sightseeing are the most common recreational activities. Occasional swimming or surfing may also occur. Camping and overnight use is prohibited in the area but has occasionally been observed. There is no access for motorized activity.

The project area has also been traditionally used by members of the Shoalwater Bay Tribe for subsistence fishing and shellfish harvesting. However, the erosional loss of the natural Graveyard Spit barrier dune and resultant infilling with sand and debris from storm overwash has resulted in a near total loss of the traditional shellfish resource. The area is also used as a source of native plants for crafting, religious, and ceremonial use. This includes sweetgrass, which is used in religious ceremonies, for basket weaving and other woven crafts, and for traditional clothing.

## 4. Adjacent and Adjoining Erosion Control Efforts

### 4.1 State Route 105 Protections

State Route (SR) 105 is the region’s primary transportation and utility corridor. There are no alternate routes for transit along the northern shore of Willapa Bay, so damage to SR 105 would compromise utility lines as well as access to schools, the Shoalwater Bay Tribe health clinic, and law enforcement and emergency response services for the businesses and communities of this region.

Over the last 50 years, WSDOT and other agencies and organizations have implemented a number of measures to respond to coastal erosion and attempt to prevent it. The approaches have varied in scale and complexity and include the relocation of SR 105 in the 1970s, construction of a 1600-foot sea groin/dike in 1998, and numerous riprap armoring structures. Pacific County Drainage District #1 continues to employ a variety of methods to slow coastal erosion and maintain drainage capacity at the drainage ditch tide gate. WSDOT also completed a hybrid berm composed of rounded cobble and large woody material in 2022 near the drainage ditch.

### 4.2 North Cove Dynamic Revetments

The rural community of North Cove has been a major erosion hotspot for over a century. Shoreline retreat has destroyed many buildings, and erosion and flooding continue to threaten additional homes, SR 105, and a significant portion of Washington’s cranberry industry. First initiated in 2016, the North Cove Dynamic Revetment Project consists of multiple nature-based strategies for reducing wave impacts, rebuilding shoreline material, and reinforcing the existing shoreline in several different North Cove locations.

Natural materials, such as cobble, sand and large wood, provide a porous surface that absorbs wave energy, rather than deflecting it to adjacent areas as typical riprap or bulkheads do. Composite beaches of mixed sand and cobble in Oregon and on the Olympic coast provided inspiration for the dynamic revetment design. The project has been extremely successful in halting the



Figure 6. This photo series shows sand accumulation and vegetation establishment between 2018 and spring of 2021 on a selected monitoring profile (profile 227) of the North Cove Dynamic Revetment Project. Provided by Hannah Drummond / CMAP.

rapid erosion of the shoreline and has resulted in the accumulation and retention of sediment and the regrowth of dune vegetation.

Local community members and organizations, including Pacific County Drainage District #1, the Pacific Conservation District, and Washaway No More, have led this effort in partnership with other members of WECAN. Adaptive management plays an ongoing role in this project. Community members involved in this project regularly witness changes along North Cove's shore and use their observations to adjust existing erosion control structures and inform future phases of work. This experience and scientific monitoring conducted by Ecology's Coastal Monitoring & Analysis Program (CMAP) on the North Cove dynamic revetments have contributed valuable information on the performance and reliability of the dynamic revetment approach in Washington State. These results have been used to inform the development and implementation of the Graveyard Spit Restoration and Resilience Project.

In September 2019, the US Army Corps of Engineers (USACE) completed a Federal Interest Determination under the Continuing Authorities Program (CAP) for the North Cove Shoreline Protection Project, which would supplement and substantially extend the existing North Cove Dynamic Revetment Project. The resulting potential recommended plan for the area includes a cobble dynamic revetment consisting of a 5,000-foot segment that would run from existing shoreline protections near Old State Route SR 105 north to Warrenton-Cannery Road, and a 3,300-foot segment that would run 3,300 feet south to the drainage ditch tide gate. The next step for this project is the feasibility study.

### **4.3 Shoalwater Berm Dune Nourishment Project**

In 2012, USACE constructed the Shoalwater Berm Dune Nourishment Project on Empire Spit, which lies directly southeast of the Graveyard Spit project site. The purpose of the Shoalwater Berm Project was to reduce coastal erosion, flooding, and coastal storm damage to the Shoalwater Reservation and Shoalwater Bay Indian Tribe. The Shoalwater Reservation includes portions of the barrier dune, intertidal areas, and areas landward of the high tide line along Graveyard Spit, Empire Spit, and the Tokeland Peninsula.

The reconstruction of the historic protective berm aimed to produce a cost-effective, environmentally acceptable, and technically feasible project that would improve the economic and social conditions of the Shoalwater Bay Tribe. USACE enlarged the berm in 2018. In total, 1.56 million cubic yards of sand were placed on Empire Spit. The Shoalwater Berm Project design originally included the construction of a cobble dynamic revetment in addition to the restored dune. However, costs, material sourcing, and site access difficulties eventually prohibited the completion of this aspect of the project.

As a result of eastward littoral transport along the north shore of Willapa Bay, sand and other material on Graveyard Spit have historically acted to naturally protect and re-nourish Empire Spit. However, the sediment supply to Graveyard Spit was reduced by the completion of the State Route 105 groin and dike. Following the development of the Shoalwater Berm Project, Graveyard Spit continued to erode, exposing the sand that was placed on Empire Spit. This has



significantly reduced Shoalwater Berm's effectiveness and longevity, requiring emergency renourishment actions to sustain the berm. For this reason, the effective maintenance of the Graveyard Spit Restoration and Resilience Project is important for maintaining the integrity of Empire Spit and Shoalwater Berm into the future.

USACE plans to undertake comprehensive repairs to the Shoalwater Berm in 2022 that will include the addition of a cobble dynamic revetment element, similar to the project's initial proposed design. It is likely that Graveyard Spit will be used as the access corridor for this repair work.

#### 4.4 Master Plan for Erosion Control Action in the Region

Pacific County is preparing a Master Plan that will link erosion efforts in the region (Figure 7) and identify gaps in existing efforts. Graveyard Spit plays a vital role in connecting all of these efforts together. Results of the finalized Master Plan will be incorporated into future updates to this plan and shall be used to further inform the continued management of the Graveyard Spit Project.



Figure 7. Ongoing and proposed erosion protection projects in the region of North Cove and Tokeland, as of January 2021. Provided by Mott MacDonald.

## 5. Management Goals and Objectives

The goals and objectives listed here lay out a broad strategy for the care and management of the Graveyard Spit Restoration & Resilience Project site once the nature-based cobble dynamic revetment construction and dune restoration activities are completed.

### Terms used:

**Project team:** refers to those who will be responsible for ensuring the goals and objectives specified within this management plan are carried out (unless otherwise specified).

- The project team includes the project manager(s), project lead(s), technical experts, project steering committee and/or other team members who lead the implementation of the Graveyard Spit Restoration & Resilience Project following the conclusion of the project's final design and permitting.
- It is anticipated that the Washington State Department of Transportation (WSDOT) will lead the project team. Additional team members may include staff from the Washington State Department of Ecology (Ecology), Shoalwater Bay Indian Tribe, U.S. Army Corps of Engineers (USACE), Pacific County, and/or other members of the WECAN community forum. These team members will be confirmed and the individual roles and responsibilities agreed upon at the time that funding for construction is secured.
- Technical experts are scientific or engineering experts with the project team that provide insight, information, monitoring results, or otherwise serve in an advisory capacity to the project.

**Project partners:** refers to parties with jurisdictional or regulatory authorities pertaining to the project or those that have significant interests in the project and its management (including members of the WECAN community forum).

**Desired** actions denote priorities that the project team will aim to accomplish to improve the management of the project over the project's lifetime. To move forward with the project and begin initial management and monitoring of the site area, it may not be necessary to acquire prior commitments and/or funding to accomplish these tasks.

## Goal 1: Prevent further erosion of Graveyard Spit and support the integrity of Empire Spit to protect State Route 105, the Shoalwater Bay Tribe, and nearby communities

**Purpose:** Protect State Route 105 (SR 105), vital community infrastructure, and natural and cultural resources from coastal erosion, flooding, and sea level rise. The long-term integrity of adjacent Empire Spit is also dependent upon stabilizing Graveyard Spit.

**Objective 1.1 – Project maintenance:** Maintain the cobble dynamic revetment and dune berm to prevent further retreat of Graveyard Spit, protect SR 105, and help stabilize the western sections of Empire Spit.

- The minimum project lifetime is 40 years, although the effective project lifetime is expected to be much longer if the dynamic revetment is adequately maintained. Up-front funding will be secured to cover project maintenance for the first 15 years. With 5 years remaining in the project lifetime, the project team will meet to discuss the extension of the project (including necessary modifications to the project and the Site Area Management Plan) and additional funding needed for future maintenance.
- The Graveyard Spit Hydraulic Design Report contains an adaptive management plan for the dynamic revetment and dune berm that provides detailed information on how the maintenance of the dune and dynamic revetment will be carried out. Topics covered include:
  - Anticipated maintenance and replenishment cycles and processes, monitoring requirements, materials, maintenance access, and the formation of an Adaptive Management Team
  - How sufficient stockpiles of material will be maintained onsite
    - Rounded cobble will be stockpiled for the purpose of necessary maintenance and repair to address erosion or deterioration of the dynamic revetment
    - Stockpiles will be replenished on regular basis to maintain a certain volume of material onsite
  - The formation of an Adaptive Management Team to guide the management of the dynamic revetment and restored dune
  - The monitoring strategy, including how and when the assessment and monitoring of the condition of the dynamic revetment and dune will be conducted
  - How maintenance and renourishment will be conducted and parties responsible, including avenues for essential urgent repair or stabilization actions.
- The project team will work with partners to utilize monitoring results and collaborative decision making practices to inform dynamic revetment and dune maintenance to achieve project goals (see Goals 4 and 5 for more information).

## Goal 2: Protect and restore sensitive dune, saltmarsh, and intertidal environments and enhance habitat for protected species

**Purpose:** The rapid loss of Graveyard Spit and deterioration of the back-barrier marsh is eliminating important habitat. This project will restore and maintain the function and integrity of natural shoreline environments to provide habitat for ESA-listed and regionally important species and provide additional coastal hazard mitigation.

*Note: Refer to Goal 5 for more information on post-construction monitoring objectives. Surveys and data collection regarding habitat, fish, and wildlife will be conducted prior to construction. This information will form the basis for the data inventory (Objective 5.1).*

**Objective 2.1 – Habitat and natural processes:** Restore and enhance degraded native habitats and improve the function of natural processes and provide additional coastal hazard mitigation.

- Inventory data and information on the status of shoreline vegetation within the project area, based on environmental permitting and evaluation processes and coordination with project partners (See also Objective 5.1).
- Carry out dune grass restoration to supplement natural regeneration processes, improve native habitat, and provide additional stabilization for the spit.
- In accordance with environmental permits, remove and relocate overwashed sediment in key wetland areas to enable natural regeneration of native plant species.
- *Desired:* Within the first three years post-construction, seek partnerships with local land management, conservation, and/or restoration organizations to identify additional restoration needs within the project area, develop corresponding restoration plans, prioritize projects, and seek funding for their implementation and completion.

**Objective 2.2 – Bird species:** Protect nesting and feeding habitat for ESA-listed bird species and other shorebirds.

- Inventory data and information on the status and presence of western snowy plover, streaked horned lark, and other bird species present within the project area, based on the Western Snowy Plover and Streaked Horned Lark Protection Plan for the site and additional environmental permitting and evaluations (See also Objective 5.1).
- Develop and execute a monitoring plan for the abovementioned species. On-site monitoring of Western Snowy Plover may be required for up to 5 years post construction.
  - The Shoalwater Bay Tribe surveys annually and will contribute data toward this objective, dependent on funding availability

- Maintain the integrity of dune and sand beach areas that were restored as part of the dune restoration component of the project and which serve as nesting habitat for ESA-listed western snowy plover and streaked horned lark (see also Goal 1).
- Undertake avoidance measures to reduce impacts to bird species during periodic maintenance and renourishment efforts, including timing/sequencing of events to avoid nesting seasons and other best management practices.
- Work with project partners, including the Shoalwater Bay Tribe, to designate areas of the project site that are off-limits to the public; post and maintain signage to prevent human impacts to ESA-listed bird species and habitat (See also Goal 3, Objective 3.1).
  - Shoalwater Bay Tribe posts signage approx. May – September.
- *Desired:* Within the first three years post-construction, seek partnerships with local conservation, and/or wildlife protection organizations to identify additional opportunities to restore and enhance shorebird habitat within the project area, develop corresponding protection/enhancement plans, prioritize projects, and seek funding for their implementation and completion.

**Objective 2.3 – Fish and shellfish:** Protect fish and shellfish habitat.

- Inventory data and information on forage fish, salmonid, and shellfish habitat and presence, based on environmental permitting and evaluation processes and coordination with project partners (See also Objective 5.1).
- Avoid, minimize, or otherwise offset potential adverse impacts to designated Essential Fish Habitat (EFH) or other designated critical habitat for ESA-listed species during periodic maintenance and renourishment efforts via consultation with NMFS, USFWS, and other agencies.
- *Desired:* Within the first three years post-construction, seek partnerships with local research, conservation and/or restoration organizations to identify impaired habitats that may contribute to forage fish, salmonid, or shellfish survival if habitat functions were enhanced or restored; develop restoration plans and projects if such areas are identified.
  - Razor clam areas are being lost in the outer shoreline below the OWHM. The terraced exposure and erosion is causing the razor clams to move further south, detrimentally affecting the Shoalwater Bay Tribe’s traditional cultural and subsistence resources.

## Goal 3: Support responsible recreational use and stewardship of the project site area

**Purpose:** Graveyard Spit is currently used by the public for a variety of non-motorized recreational activities. This project will ensure that responsible recreation may continue and that stewardship is encouraged to allow for continued enjoyment of the area while protecting critical habitat and native species. Motorized access will not be allowed and signage will indicate areas closed for restoration or to protect wildlife.

**Objective 3.1 – Public Access:** Support safe and sustainable public access to the shoreline while reducing human impacts to critical habitats and protected species.

- Work cooperatively with project partners and community members to inventory types of public use and recreational activities present on site (including recreational fishing, walking, and swimming/surfing),
- Work with project partners to identify and delineate jurisdictional boundaries and authorities (including lands of the Shoalwater Bay Tribe and the Seashore Conservation Area managed by Washington State Parks & Recreation) and identify public use parameters and restrictions.
- In coordination with site jurisdictional authorities and environmental agencies, install and maintain signage that provides important information regarding public access to the site, including:
  - Information on public access areas and allowable uses (i.e. non-motorized recreation)
  - Delineation of areas closed to the public (e.g. designated habitat for ESA-listed species, dune grass area undergoing restoration, etc.)
- The project team, Shoalwater Bay Tribe, Washington State Parks & Recreation, WDFW, and other partners will coordinate to determine necessary enforcement responsibilities.

**Objective 3.2 – Public stewardship:** Increase public awareness of the project and promote public stewardship of the site area.

- Install and maintain educational signage at public access points to convey the unique attributes of the Graveyard Spit Restoration & Resilience Project and promote conservation ethics and public stewardship of the site area. Coordinate with project partners to ensure signage is clear and accurate.
- Regularly provide project updates and information to the managers of the Coastal Hazards Resilience Network (CHRN). Managers of the CHRN will maintain and update the [Graveyard Spit Restoration & Resilience Project webpage](#) in order to provide access to information about the project, the management of the site, and to encourage community feedback and stewardship.

- Collaborate with partners to encourage public participation and comment in WECAN meetings and project-specific meetings regarding the management of the site area (see also Goal 5).
- *Desired:* Seek partnerships with local organizations or institutions that can help to further educate the public about the project, promote public stewardship of the site area, and encourage participation in public meetings, citizen science initiatives, etc.
- *Desired:* Seek partnerships with local conservation or research organizations and/or funding sources to provide periodic assessments of public use and associated impacts over time (see also Goal 5).

## Goal 4: Engage in regional coordination and prioritize transparent and collaborative planning and decision-making

**Purpose:** To achieve the long-term multi-benefit goals of the project and contribute toward regional erosion resilience efforts, there is an imperative to share information and work together with project partners, management authorities, stakeholders, and community members in the area. Insights and perspectives from these groups will inform the continued management of the site, as the impacts of this project and any alterations or interventions regarding its management have broad implications for the region. Transparent and collaborative processes will allow these groups to participate in site management decision making and improve the collective success of all erosion efforts in the region.

**Objective 4.1 – Information sharing, collaboration, and coordination:** Share project updates with the public, collaborate with local stakeholders and project partners, and coordinate with other erosion control efforts in the region.

- Project team representatives will participate in and share information at regular meetings of the Willapa Erosion Control Action Now (WECAN) community forum or other relevant public meetings/workshops.
- Collaborate and coordinate with other erosion control efforts in the region, including the Shoalwater Berm Dune Nourishment Project, Section 103 North Cove Protection Project, Pacific County Drainage District No. 1, and others to identify gaps, synergies, and cost-saving collaborative measures, share knowledge and lessons learned, and ensure that project efforts complement and support one another.
- Particular attention should be given to transition zones on the eastern and western borders of the project area to collaboratively identify and address issues that could adversely affect the success of the project and adjacent efforts.

**Objective 4.2 – Host an annual project workshop:** The project team and technical experts will prepare and participate in an annual Graveyard Spit Science-Management Workshop that is open to members of WECAN and the public.

- Collaborate with partners and technical experts to organize a Graveyard Spit Science-Management Workshop once a year to discuss the status of the project, the current conditions of the spit, and the ongoing management of the site area. This meeting will also include overviews of any applicable monitoring results or new research regarding the site area (as outlined in Goal 5).
- Invite and encourage members of WECAN and the public to attend the workshop in order to provide comments and observations regarding the site area, public use, and other present conditions, as well as ask questions of the project team or technical experts.
- Based on the information presented, the possibility of amendments or adjustments to the management of the site will also be discussed, to inform project team meetings on potential adaptive management changes (see Objective 5.3).

## Goal 5: Carry out monitoring and adaptive management of the project site area to anticipate and respond to future conditions

**Purpose:** The Graveyard Spit Restoration & Resilience Project is a unique and innovative solution to address a complex set of issues and priorities. There are unknowns associated with the performance of the project and potential changes to the site following the project's completion due to climate change or other factors. As such, the management process requires frequent, data- and observation-driven evaluation and must incorporate the option for responsive course corrections through adaptive management. This will help ensure the project's success and will generate learning outcomes to inform future applications of similar collaborative, multi-benefit coastal hazards solutions.

**Objective 5.1 – Data inventory:** Using survey data and other information gathered for permitting and pre-construction assessment purposes, formally organize and inventory existing data and information on site conditions.

- Create and support a collective data and information repository to be used to inform ongoing management and maintenance of the project.
- Coordinate with partners to compile baseline conditions using site assessments, permit evaluations, and other applicable research, monitoring data, current uses, local knowledge, and citizen science.
- Continue to inventory new data and information collected through site monitoring, observations, and other sources.

**Objective 5.2 – Post-construction site monitoring:** Continue to undertake data collection and monitoring efforts to assess the condition of the revetment and dune as well as the impacts of the project on the spit geomorphology, native species, and human uses.



Monitoring will occur for initial 5 years post-construction, at minimum. Prior to this date, the project team will meet to discuss monitoring requirements to inform the continued adaptive management of the site.

*Note: This section will be updated with any additional post-construction monitoring objectives and requirements based upon environmental permits, mitigation plans, etc.*

- The dynamic revetment, restored dune, and geomorphic conditions of the spit will be monitored on a regular basis over the lifetime of the project, in accordance with the monitoring strategy discussed in Section 8.4 of the Graveyard Spit Hydraulic Design Report.
  - → *Ecology’s Coastal Monitoring and Analysis Program (CMAP) may be contracted to provide monitoring capabilities*
- Diversity and density of vegetation and wildlife.
  - ESA-listed species, including western snowy plover and streaked horned lark, will be monitored in accordance with environmental permits and other requirements. On-site monitoring of Western Snowy Plover may be required for up to 5 years post construction.
  - → *Shoalwater Bay Tribe conducts monitoring surveys annually, depending on funding availability, and will provide surveys within the project site area*
  - → *WSDOT will ensure monitoring is conducted in accordance with environmental permits and funding requirements*
- *Desired:* The following monitoring and information gathering actions will be carried out or facilitated by the project team and project partners:
  - Drone imagery (in compliance with jurisdictional permit requirements) and other photography, particularly during or after large storm or king tide events
    - → *WSDOT could provide drone imagery monitoring capabilities*
    - → *Shoalwater Bay Tribe could provide drone imagery as able*
  - Public observations regarding the conditions and use of the site area,
    - → *Solicited during WECAN meetings and/or the public comment period of the annual Graveyard Spit Science-Management Workshop (see Goal 4)*
  - Citizen science
    - → *Connie Allen (Washaway No More) could help provide photo point monitoring capability via “Shoot the Shore” metal statue photography submitted to [MyCoast Washington Beach Photo Reports](#) or similar platforms.*
- *Desired:* Promote and support external research projects that focus on examining, monitoring, or assessing environmental conditions, human impacts, and/or changes to the site over time (e.g. academic studies, assessments conducted by local organizations, other third party efforts).

**Objective 5.3 – Reporting and adaptive management:** Update management and monitoring plans as necessary, based upon monitoring results, observations, and new information.

- The project team will prepare a brief annual report after each storm season documenting monitoring and survey results as well as any maintenance, repair, or renourishment actions taken. The report will be made available to public.
- The project team will host a public Graveyard Spit Science-Management Workshop once a year to provide project updates, answer questions, and solicit adaptive management observations and needs from project partners, stakeholders, and local community members (see also Goal 4). Potential changes or adjustments to the management of the site area may be discussed.
  - Prior to the workshop, the project team and technical experts will meet to examine and assess monitoring data and prepare for the workshop.
- The project team will also convene with technical experts to determine whether changes or adjustments to the management of the site are needed to ensure the goals of the project continue to be met. This allows for adaptive management actions to be discussed and/or taken in response to winter (storm season) and summer (accretion season) conditions.
  - Results of the Graveyard Spit Science-Management Workshop will help inform this process.
  - This process will be informed by a review of any applicable reports, research, monitoring results, observations, public comments, or other relevant information relating to environmental and geomorphic conditions, public activity in and around the site area, or other factors and changes that may affect the project and its management goals.
  - Monitoring results will be assessed in comparison to performance standards, as identified by environmental permits, mitigation plans, etc.
  - This information will be used to inform whether current management actions are meeting the goals and objectives of the Graveyard Spit Restoration & Resilience Project. If management actions are failing to create the desired conditions at the site, potential changes will be evaluated and adopted in order to better achieve the desired conditions.
  - The project team will avoid making management changes that could adversely impact the integrity of Graveyard Spit or the health and functionality of the dune, marsh, and intertidal environments present on site.
- The initial project lifetime is 15 years. With 5 years remaining in the project lifetime, the project team will meet to discuss the extension of the project (including modifications to the project and the Site Area Management Plan), securing additional funding for future management/maintenance, updating site area monitoring requirements, and other associated topics.

## References

- Allen, Douglas. 2004. *Shoalwater Willapa*. Snoose Peak Publishing, South Bend, Washington.
- Decker, K. 2017 North Cove: Economic impacts of erosion. Washington Sea Grant.
- Hajda, Y. 1990. Southwestern Coast Salish. In, *Northwest Coast*, edited by W. Suttles, pp. 503-517. Handbook of North American Indians Volume 7. Smithsonian Institution, Washington D.C.
- Kiers, R. 2021. Cultural Resources Survey, SR 105 / Graveyard Spit Dune Restoration Project, Pacific County, Washington. Short Report No. 21 – 03. Washington State Department of Transportation.
- Michalsen, D. 2018. Willapa Bay – Washington State Department of Transportation SR-105: Feasibility of long-term shoreline stabilization alternatives between North Cove and Tokeland, WA. U.S. Army Corps of Engineers, Seattle District Publication.
- Morton, R.A., Purcell, N.A., and Peterson, R.L. 2002. Large-scale cycles of Holocene deposition and erosion at the entrance to Willapa Bay, Washington - implications for future land loss and coastal change. USGS Open File Report, 02-46, Menlo Park, CA.
- Mott MacDonald. 2020. North Willapa Shoreline Erosion Protection Demonstration Project Design Report. <https://wacoastalnetwork.com/wp-content/uploads/2021/01/Willapa-North-Shoreline-Protection-Demonstration-Project-Master-Plan-Report-with-Appendices.pdf>
- Park, J., Schanz, R., Jackson, G. 2015. Analysis of Options for Maintaining SR 105 near Washaway Beach. Washington State Department of Transportation Environmental Services Hydrology Program.
- Patten, K. 2017. Economic assessment to the cranberry industry in the southern half of Grayland, WA resulting from coastal erosion and subsequent tidal inundation. Washington State University Long Beach Research and Extension Unit. [https://wacoastalnetwork.com/wp-content/uploads/2020/11/Grayland-erosion-impact-to-cranberries-1\\_9\\_19-patten-WSU.pdf](https://wacoastalnetwork.com/wp-content/uploads/2020/11/Grayland-erosion-impact-to-cranberries-1_9_19-patten-WSU.pdf)
- Ray, V. F. 1938. Lower Chinook Ethnographic Notes. University of Washington Publications in Anthropology 7(2):29-165.
- Schanz, R., Jackson, G. 2018. SR 105 MP 20 Washaway Beach 2018 Dynamic Revetment Monitoring Report. Washington State Department of Transportation Headquarters Hydraulics Office.
- Talebi, B., Kaminsky, G.M., Ruggiero, P., Levkowitz, M., McGrath, J., Serafin, K., McCandless, D. 2017. Assessment of Coastal Erosion and Future Projections for North Cove, Pacific County. Washington State Department of Ecology. Publication no. 17-06-010. <https://apps.ecology.wa.gov/publications/documents/1706010.pdf>

U.S. Fish and Wildlife Service (USFWS). 2007. Recovery Plan for the Pacific Coast Population of the Western Snowy Plover (*Charadrius alexandrinus nivosus*). In 2 volumes. Sacramento, California. 751 pages.

Weiner, H., Kaminsky, G. M., Hacking, A., McCandless, D. 2019. North Cove Dynamic Revetment Monitoring: Winter 2018-2019. Washington State Department of Ecology. Publication no. 19-06-008.